

Claims

1. A multifunction card device, wherein

a plurality of semiconductor chips are mounted over a wiring substrate over which an external connection terminal was formed, the semiconductor chip of 1 includes an interface controller connected to the external connection terminal, and another semiconductor chip includes a memory connected to the interface controller;

the interface controller has a plurality of interface control modes, and controls an external-interface action and a memory interface action by a control mode according to an instruction from an outside;

external connection terminals have an individual terminal individualized for every interface control mode, and a common terminal communalized for every interface control modes of a plurality of;

a clock input terminal, a power supply terminal, and an earthing terminal are included in the common terminal; and

a data terminal is included in the individual terminal.

2. A multifunction card device according to claim 1, wherein

the multifunction card device has further a security controller which included a semiconductor chip a same as that of the interface controller, or another;

the security controller is connected to the interface controller and an external connection terminal; and

a dedicated terminal of the security controller is further included in the individual terminal.

3. A multifunction card device according to claim 2, comprising a clock terminal, a data input output terminal, a reset terminal, a power supply terminal, and an earthing terminal as a dedicated terminal of the security controller.

4. A multifunction card device according to claim 2, wherein
the security controller performs a security process according to a
signal state of the external terminal, or an action command given from the
interface controller.

5. A multifunction card device according to claim 4, wherein
the multifunction card device has an internal antenna further and a
non-contact interface is possible for the security controller using the
antenna.

6. A multifunction card device according to claim 5, further
comprising an external antenna connection terminal which can connect an
external antenna, and a switching circuit which can connect the external
antenna connection terminal to the security controller selectively instead of
the internal antenna.

7. A multifunction card device according to claim 6, wherein
the switching circuit includes a nonvolatile memory element
intervening between corresponding connection terminals and being
controllable in cutoff or conduction of a path according to a threshold voltage
which can be electrically changed and a controlling circuit which stops the
path treating a threshold voltage seen from a selection terminal of the
nonvolatile memory element as a first condition, and performs conduction of
the path treating the threshold voltage as a second condition; and
the selection terminal is connected to a ground voltage of a circuit in
the second condition of the threshold voltage.

8. A multifunction card device according to claim 7, wherein
on both sides of the nonvolatile memory element, a switch for
isolation of a pair is arranged in series;

the switch for isolation is made into an ON state by connecting a selection terminal to a ground voltage of a circuit; and

the controlling circuit controls the switch for isolation to an OFF state, when changing a threshold voltage of the nonvolatile memory element.

9. A multifunction card device according to claim 8, wherein

the nonvolatile memory element comprises a bipolar transistor part, and a nonvolatile MOS transistor part whose drain source was connected between base collector of the bipolar transistor part, and as for a nonvolatile MOS transistor part, a charge storage region is formed via an insulating layer over a channel between source drain, and threshold voltage is made adjustable according to a charge accumulated in this charge storage region.

10. A multifunction card device according to claim 2, comprising an external power source terminal for exclusive use for the security controller as the individual terminal.

11. A multifunction card device according to claim 2, comprising an external power source terminal common to the security controller and the interface controller as the external connection terminal, and comprising a power switch which can stop a power supply by control of the interface controller in a power supply path from the common external power source terminal to a power supply terminal of the security controller.

12. A multifunction card device according to claim 2, wherein

the multifunction card device has an external power source terminal common to the security controller and the interface controller as the external connection terminal, and the security controller has an input terminal of a reset signal with which power on reset is directed from the interface controller.

13. A multifunction card device according to claim 2, wherein
the external connection terminal has an external power source terminal, operation power is supplied from the external power source terminal to the interface controller, the security controller generates a power source for the security controller based on the operation power, and the security controller has an input terminal of a reset signal with which power on reset is directed from the interface controller.

14. A multifunction card device according to claim 2, wherein
the multifunction card device further has an antenna, and a non-contact interface of a semiconductor chip which includes the security controller is enabled connecting with the antenna; and
the wiring substrate has a division ground pattern which is divided into plurality as a ground pattern with which a grounding electric potential of a circuit is applied and which was connected without forming closed circuit.

15. A multifunction card device according to claim 2, wherein
the multifunction card device further has an antenna, and a non-contact interface of a semiconductor chip which includes the security controller is enabled connecting with the antenna; and
the antenna is arranged in an outside area of a semiconductor chip, and a stack of a semiconductor chip is performed over a ferrite plate.

16. A multifunction card device according to claim 15, wherein
the ferrite plate is a ferrite chip, the applied ferrite paste, or the stuck ferrite film.

17. A multifunction card device according to claim 2, wherein
the multifunction card device further has an antenna, and a non-contact interface of a semiconductor chip which includes the security

controller is enabled connecting with the antenna; and
a ferrite plate has been arranged in a central part of the antenna.

18. A multifunction card device according to claim 17, wherein
a semiconductor chip is arranged in a side of an antenna and covered
with a metal cap or a ferrite cap.

19. A multifunction card device according to claim 15 or 17, wherein
the antenna is a coil pattern formed in a wiring substrate, or a
winding wire coil arranged over a wiring substrate.

20. A multifunction card device according to claim 2, wherein
the multifunction card device further has an antenna, and a
non-contact interface of a semiconductor chip which includes the security
controller is enabled connecting with the antenna; and
the antenna is a dielectric antenna chip and a stack is performed
over a ferrite plate.

21. A multifunction card device according to claim 20, wherein
a stack of the semiconductor chip is performed over a ferrite plate,
and over an opposite surface of a stack face of a dielectric antenna chip.

22. A multifunction card device according to claim 1 or 2, wherein
a whole is covered with a cap exposing the external connection
terminal; and
the cap is a ferrite mixing cap or a metal cap.

23. A multifunction card device according to claim 2, wherein
the multifunction card device further has an antenna, a non-contact
interface of a semiconductor chip which includes the security controller is
enabled connecting with the antenna, and a whole is covered by casing

exposing the external connection terminal;

the antenna is formed in an outside area of a semiconductor chip, and a stack of a semiconductor chip is performed over a ferrite plate; and

with a receiving surface by an antenna, electromagnetic shielding was formed in an opposite side.

24. A multifunction card device according to claim 23, wherein the electromagnetic shielding is a ferrite mixing layer of casing, a metal mixing layer of casing, a coating surface of a ferrite mixing coating applied to casing, a coating surface of a metal mixing coating applied to casing, or a metal evaporation label stuck over casing.

25. A multifunction card device according to claim 24, wherein the casing is a cap or a resin molding.

26. A multifunction card device according to claim 23, comprising a capacitor for tuning externally attached between connection terminals of an antenna.

27. A multifunction card device according to claim 26, wherein the capacitor for tuning is a chip capacitor, a variable capacitance capacitor, or a nonvolatile MOS capacity.

28. A multifunction card device according to claim 1 or 2, wherein a whole is sealed by a package exposing an external connection terminal, and at least two level difference parts stoppéd by a socket are formed in a thickness direction of the package.

29. A multifunction card device according to claim 28, wherein the two level difference parts are unsymmetrical.

30. A multifunction card device according to claim 29, wherein the external connection terminals exposed out of the package are non-line symmetry to a center of the package.

31. A multifunction card device according to claim 30, wherein the external connection terminal exposed out of the package is arranged in parallel by plural lines, and the plural lines have a deviation to a level difference part of a package.

32. A multifunction card device according to claim 30, wherein the external connection terminals exposed out of the package are arranged in parallel by plural lines, and the plural lines have deviation mutually to a parallel direction.

33. A multifunction card device according to claim 1 or 2, wherein as for a plurality of semiconductor chips, a semiconductor chip with smaller surface area is more thinly formed, and a thinner semiconductor chip is arranged at an upper layer.

34. A multifunction card device according to claim 1 or 2, wherein a whole is sealed by a package exposing an external connection terminal, and the external connection terminal which is made to expose out of the package includes a first external terminal connected to a terminal of a card socket, and a plurality of test terminals connected with the first external terminals respectively, and having bigger pitch and surface area than the first external terminal.

35. A multifunction card device according to claim 34, wherein the first external terminals are arranged at plural lines being spaced out, and the second external terminals are arranged between the plural lines.

36. A multifunction card device, comprising an external connection terminal, a controller connected to the external connection terminal, and a memory connected to the controller, over a wiring substrate, wherein

the controller has a plurality of interface control modes, and controls an external-interface action and a memory interface action by a control mode according to an instruction from an outside;

external connection terminals have an individual terminal individualized for every interface control mode, and a common terminal communalized for every interface control modes of a plurality of;

a clock input terminal, a power supply terminal, and an earthing terminal are included in the common terminal; and

a data terminal is included in the individual terminal.

37. A multifunction card device, comprising an external connection terminal, an interface controller connected to the external connection terminal, a memory connected to the interface controller, and a security controller connected to the interface controller and an external connection terminal, over a wiring substrate, wherein

the interface controller has a plurality of interface control modes, and controls an external-interface action and a memory interface action by a control mode according to an instruction from an outside;

external connection terminals have an individual terminal individualized for every interface control mode, and a common terminal communalized for every interface control mode;

a clock input terminal, a power supply terminal, and an earthing terminal are included in the common terminal; and

a data terminal, and a dedicated terminal of the security controller are included in the individual terminal.

38. A multifunction card device according to claim 37, comprising a

clock terminal, a data input output terminal, a reset terminal, a power supply terminal, and an earthing terminal as a dedicated terminal of the security controller.

39. A multifunction card device, comprising an external connection terminal, an interface controller connected to the external connection terminal, a memory connected to the interface controller, and a security controller connected to the interface controller and an external connection terminal, over a wiring substrate, wherein

the interface controller has a plurality of interface control modes, and controls an external-interface action and a memory interface action by a control mode according to an instruction from an outside; and

the security controller performs a security process according to a signal state of the external terminal, or an action command given from the interface controller.

40. A multifunction card device according to claim 37, wherein

the multifunction card device has an internal antenna further and a non-contact interface is possible for the security controller using the antenna.

41. A multifunction card device according to claim 40, further comprising an external antenna connection terminal which can connect an external antenna, and a switching circuit selectively connectable with the security controller for an external antenna connection terminal instead of the internal antenna.

42. A multifunction card device according to claim 41, wherein

the switching circuit has a nonvolatile memory element intervening between corresponding connection terminals and being controllable in cutoff or conduction of a path according to a threshold voltage which can be

electrically changed, and a controlling circuit which stops the path treating a threshold voltage seen from a selection terminal of the nonvolatile memory element as a first condition, and performs conduction of the path treating the threshold voltage as a second condition; and

the selection terminal is connected to a ground voltage of a circuit in the second condition of a threshold voltage.

43. A multifunction card device according to claim 42, wherein on both sides of the nonvolatile memory element, a switch for isolation of a pair is arranged in series;

the switch for isolation is made into an ON state by connecting a selection terminal to a ground voltage of a circuit; and

the controlling circuit controls the switch for isolation to an OFF state, when changing a threshold voltage of a nonvolatile memory element.

44. A multifunction card device according to claim 43, wherein the nonvolatile memory element comprises a bipolar transistor part, and a nonvolatile MOS transistor part whose drain source was connected between base collector of the bipolar transistor part, and as for a nonvolatile MOS transistor part, a charge storage region is formed via an insulating layer over a channel between source drain, and threshold voltage is made adjustable according to a charge accumulated in this charge storage region.

45. A multifunction card device, comprising an external connection terminal, an interface controller connected to the external connection terminal, a security controller connected to the interface controller and an external connection terminal, and a memory connected to the interface controller, over a wiring substrate, wherein

the external connection terminal has an external power source terminal for exclusive use for the security controller.

46. A multifunction card device, comprising an external connection terminal, an interface controller connected to the external connection terminal, a security controller connected to the interface controller and an external connection terminal, and a memory connected to the interface controller, over a wiring substrate, wherein

the external connection terminal has an external power source terminal common to the security controller and the interface controller, and the multifunction card device has a power switch which can stop a power supply by control of the interface controller in a power supply path from the external power source terminal to a power supply terminal of the security controller.

47. A multifunction card device, comprising an external connection terminal, an interface controller connected to the external connection terminal, a security controller connected to the interface controller and an external connection terminal, and a memory connected to the interface controller, over a wiring substrate; wherein

the external connection terminal has an external power source terminal common to the security controller and the interface controller, and the security controller has an input terminal of a reset signal with which power on reset is directed from the interface controller.

48. A multifunction card device, comprising an external connection terminal, an interface controller connected to the external connection terminal, a security controller connected to the interface controller and an external connection terminal, and a memory connected to the interface controller, over a wiring substrate, wherein

the external connection terminal has an external power source terminal, operation power is supplied from the external power source terminal to the interface controller, the security controller uses as operation power what performed voltage control using the operation power, and the

security controller has an input terminal of a reset signal with which power on reset is directed from the interface controller.

49. A semiconductor card device comprising a wiring substrate, a semiconductor chip mounted over the wiring substrate, and an antenna connected to the semiconductor chip, wherein

a non-contact interface of a semiconductor chip is enabled using the antenna; and

the wiring substrate has a division ground pattern which was divided into plurality and connected without forming a closed circuit as a ground pattern with which the grounding electric potential of a circuit is applied.

50. A semiconductor card device comprising a wiring substrate, a semiconductor chip mounted over the wiring substrate, and an antenna connected to the semiconductor chip, wherein

the antenna is arranged in an outside area of the semiconductor chip, and a stack of the semiconductor chip is performed over a ferrite plate.

51. A semiconductor card device according to claim 50, wherein

the ferrite plate is a ferrite chip, an applied ferrite paste, or a stuck ferrite film.

52. A semiconductor card device comprising a wiring substrate, a semiconductor chip mounted over the wiring substrate, and an antenna connected to the semiconductor chip, wherein

a ferrite plate has been arranged in a central part of the antenna.

53. A semiconductor card device according to claim 52, wherein

a semiconductor chip is arranged in a side of an antenna and covered with a metal cap or a ferrite cap.

54. A semiconductor card device according to claim 50 or 52, wherein the antenna is a coil pattern formed in the wiring substrate, or a winding wire coil arranged over the wiring substrate.

55. A semiconductor card device according to claim 50 or 52, comprising a capacitor for tuning externally attached between connection terminals of an antenna.

56. A semiconductor card device according to claim 55, wherein the capacitor for tuning is a chip capacitor, a variable capacitance capacitor, or a nonvolatile MOS capacity.

57. A semiconductor card device comprising a wiring substrate, a semiconductor chip mounted over the wiring substrate, and an antenna connected to the semiconductor chip, wherein

the antenna is a dielectric antenna chip and a stack is performed to a ferrite plate.

58. A semiconductor card device according to claim 57, wherein a stack of the semiconductor chip is performed over a ferrite plate, and over an opposite surface of a stack face of a dielectric antenna chip.

59. A semiconductor card device comprising a wiring substrate which exposed an external connection terminal on a one side, a semiconductor chip mounted over the wiring substrate, an antenna connected to the semiconductor chip, and a cap which covers the wiring substrate, the semiconductor chip, and the antenna exposing the one side of the wiring substrate, wherein

the cap is a ferrite mixing cap or a metal cap.

60. A semiconductor card device comprising a wiring substrate which

exposed an external connection terminal on a one side, a semiconductor chip mounted in the wiring substrate, an antenna connected to the semiconductor chip, and a casing which covers the wiring substrate, the semiconductor chip, and the antenna exposing the one side of the wiring substrate, wherein

the antenna is formed in an outside area of the semiconductor chip, and a stack of the semiconductor chip is performed over a ferrite plate; and

electromagnetic shielding was formed in an opposite side with a receiving surface by the antenna.

61. A semiconductor card device according to claim 60, wherein

the electromagnetic shielding is a ferrite mixing layer of casing, a metal mixing layer of casing, a coating surface of a ferrite mixing coating applied to casing, a coating surface of a metal mixing coating applied to casing, or a metal evaporation label stuck over casing.

62. A semiconductor card device according to claim 60, wherein the casing is a cap or a resin molding.

63. A semiconductor card device with which a semiconductor chip mounted over a wiring substrate was sealed by a package, wherein

at least two level difference parts stopped by a socket are formed in a thickness direction of the package.

64. A semiconductor card device according to claim 63, wherein the package is a package formed with a mold array package form.

65. A semiconductor card device according to claim 63, wherein the two level difference parts are unsymmetrical.

66. A semiconductor card device according to claim 63, wherein external connection terminals exposed out of the package are

non-line symmetry to a center of the package.

67. A semiconductor card device according to claim 66, wherein the external connection terminals exposed out of the package are arranged in parallel by plural lines, and the plural lines have deviation to the level difference part of the package.

68. A semiconductor card device according to claim 66, wherein the external connection terminals exposed out of the package are arranged in parallel by plural lines, and the plural lines have deviation mutually to a parallel direction.

69. A semiconductor card device comprising a plurality of semiconductor chips stacked in layers over a wiring substrate, wherein as for the semiconductor chips, a semiconductor chip with smaller surface area is more thinly formed, and a thinner semiconductor chip is arranged at an upper layer.

70. A semiconductor card device with which a semiconductor chip was sealed by a package, comprising a plurality of first external terminals exposed out of the package, and a plurality of test terminals which are connected with the first external terminals, respectively and whose pitch and surface area are bigger than the first external terminal.

71. A semiconductor card device according to claim 70, wherein The first external terminals are arranged at plural lines being spaced out, and the second external terminals are arranged between the plural lines.

72. A semiconductor integrated circuit which has a power switch circuit which can alternatively stop an operation power of a circuit, wherein

the power switch circuit has a nonvolatile memory element which was placed between channels of communication of operation power and whose alteration of threshold voltage was enabled electrically, and a controlling circuit which stops the channels of communication treating a threshold voltage seen from a selection terminal of the nonvolatile memory element as a first condition, and performs conduction of the channels of communication treating the threshold voltage as a second condition; and

the selection terminal is connected to a fixed potential of a circuit in the second condition of the threshold voltage.

73. A semiconductor integrated circuit according to claim 72, wherein on both sides of the nonvolatile memory element, a switch for isolation of a pair is arranged in series;

the switch for isolation is made into an ON state by connecting the selection terminal to a fixed potential of a circuit; and

the controlling circuit controls the switch for isolation to an OFF state, when changing a threshold voltage of the nonvolatile memory element.

74. A semiconductor integrated circuit which has a switching circuit which can alternatively stop between circuits, wherein

the switching circuit has a nonvolatile memory element which was placed between wiring routes connecting between circuits and whose alteration of threshold voltage was enabled electrically, and a controlling circuit which stops the wiring route treating a threshold voltage seen from a selection terminal of the nonvolatile memory element as a first condition, and performs conduction of the wiring route treating the threshold voltage as a second condition; and

the selection terminal is connected to a fixed potential of a circuit in the second condition of the threshold voltage.

75. A semiconductor integrated circuit according to claim 74, wherein

on both sides of the nonvolatile memory element, a switch for isolation of a pair is arranged in series;

the switch for isolation is made into an ON state by connecting the selection terminal to a ground voltage of a circuit; and

the controlling circuit controls the switch for isolation to an OFF state, when changing a threshold voltage of the nonvolatile memory element.